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Research Institute of Innovative Technology for the Earth

Stimulating Innovation

CSLF Technical Groups Workshop

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Carbon Dioxide capture

- **Amine scrubbing from flue gases of the large-scale stationary sources**
- **Capture technology exists in a scale of 3000 MMTCO$_2$/day**
- **Total cost of either ocean or subsurface storage is ca 50USD/ton CO$_2$storage**
- **R&D on novel capture technologies is now being challenged**

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Sequestration

Where can we put CO_2 ?

- **ocean**
- **underground**

capacity is enough
cost issue & public acceptance is the key

Government-supported Study Programs in Japan on CO_2 Sequestration

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Target technology	Period of the study	Funding
injection to depleted oil & gas fields and use in EOR	FY1990	NEDO
general disposal options of CO_2 from power stations, to ocean and underground	FY1991 to FY1998	Agency for Energy & Resources
ocean sequestration (dissolution type)	FY1997 to FY2002	NEDO
aquifer sequestration	FY2000 to FY2004	NEDO & METI
ECBM	FY2002 to FY2006	METI
impact assessment methodology and dilution technology by moving-ship for ocean sequestration	FY2002 to FY2006	METI
injection to geothermal field	FY2002 to FY2004	NEDO
monitoring of the CO_2 behavior underground	FY2002 to FY2004	NEDO

CO_2 INJECTION TO DEPTHS

energy penalty of sequestration processes

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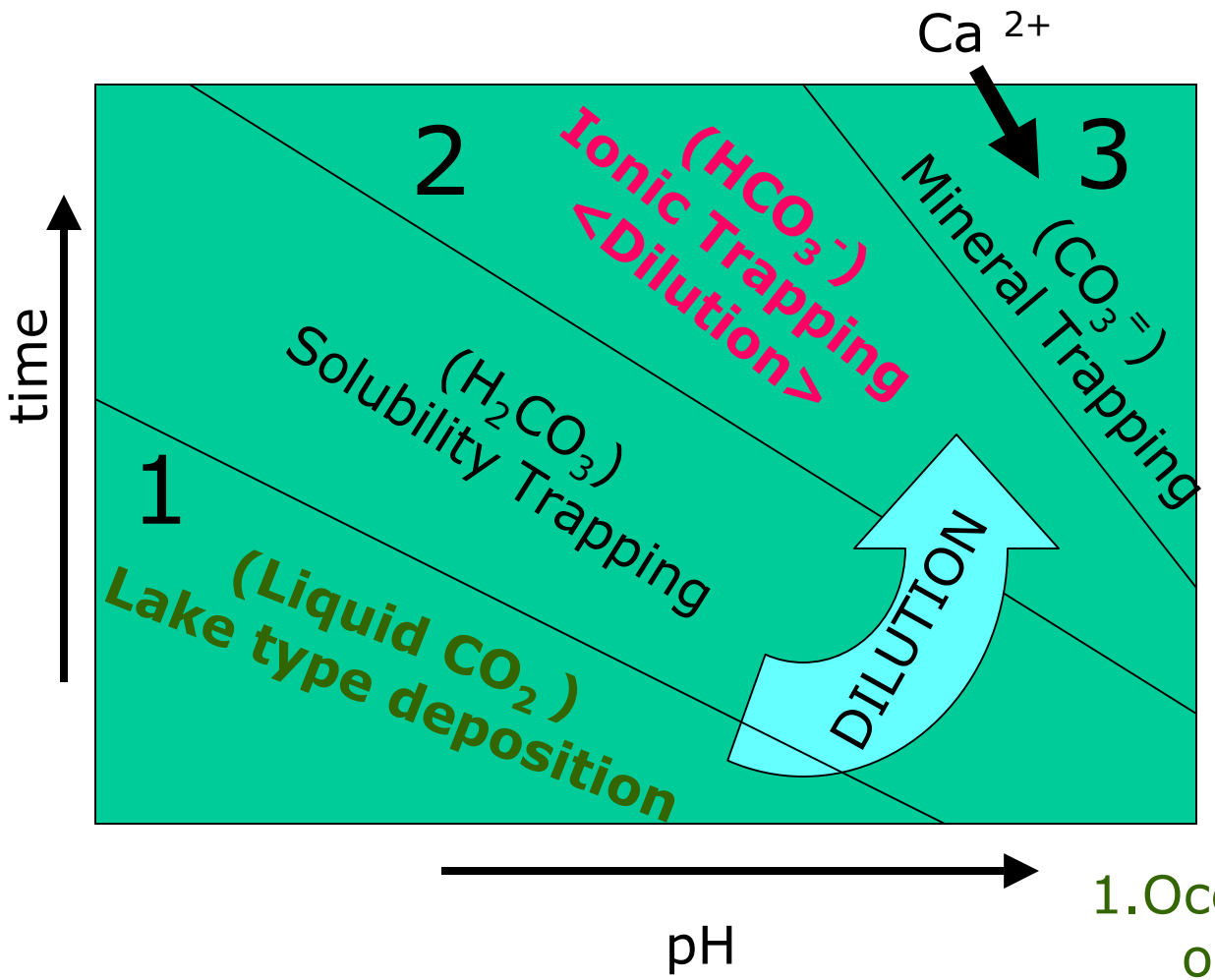
- The hydrostatic pressure :the zero-th order barrier for the gas isolation from the atmosphere
- For every gas molecule, regardless of the chemical species, the compression energy from a normal gaseous state to a condensed state is almost the same.
- This means that the energy penalty in the process of compression for the mixture of gases containing CO_2 is inversely proportional to the CO_2 contents the gas mixture,
- Without separation of CO_2 from the other gases, the compression energy of the whole gas mixture would become too much large.

Storage mechanism

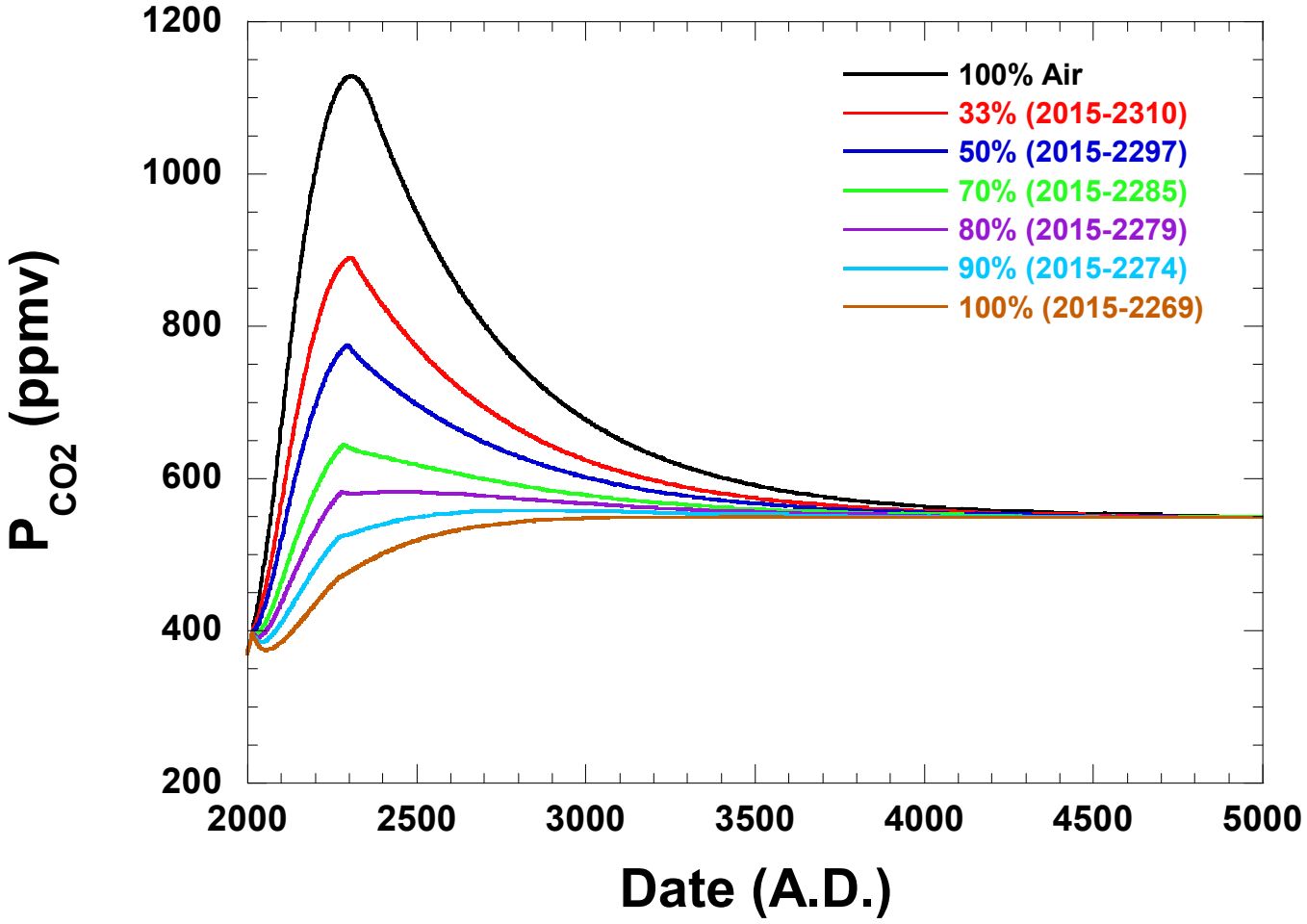


3. Limestone Neutralization : Storage as $Ca^{2+}_{(added)} + CO_3^{=}$

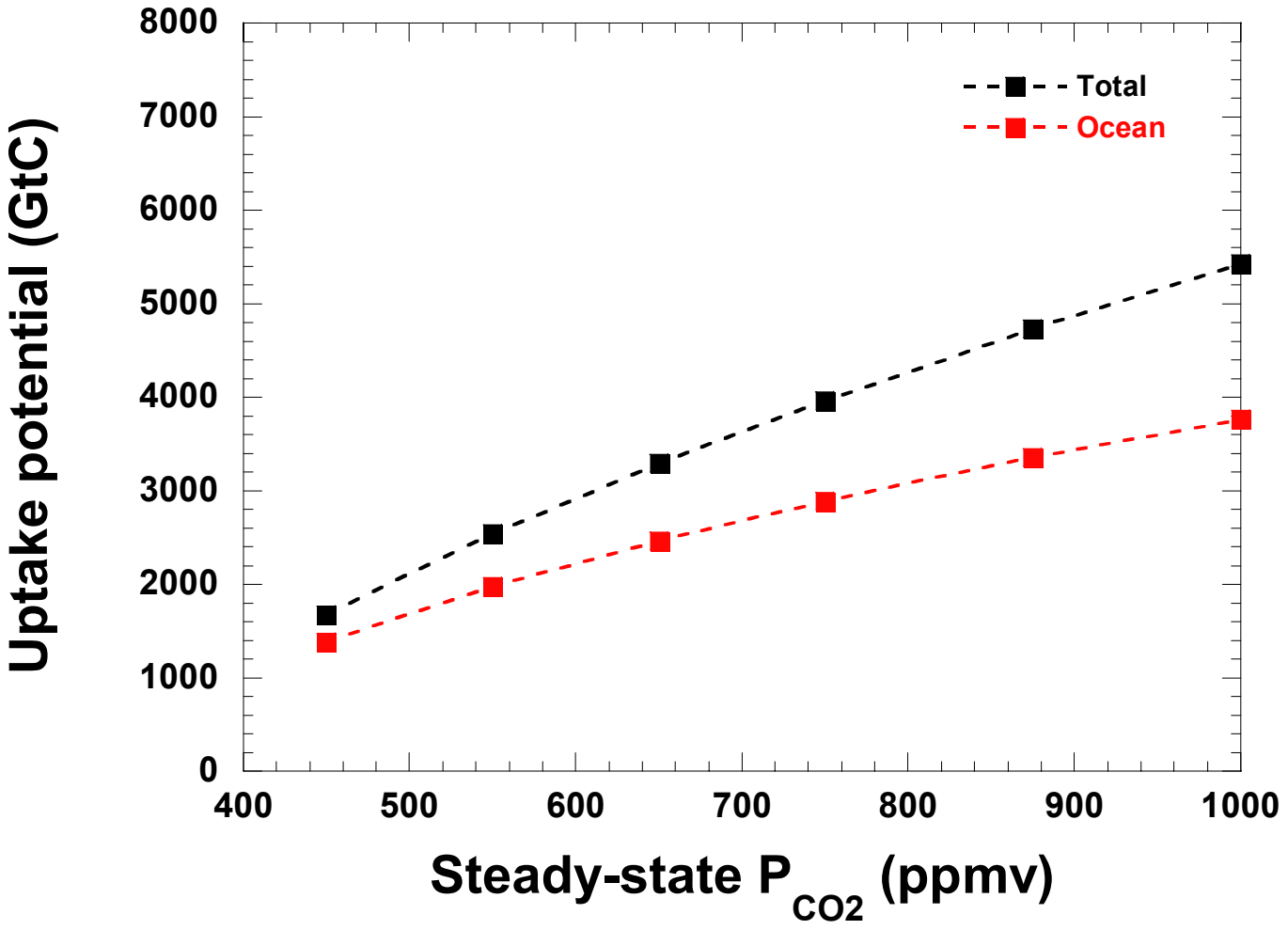
2. Dilution : Stored as HCO_3^- through reaction: $CO_2 + CO_3^{=} + H_2O \rightarrow 2HCO_3^-$

1.Ocean floor Lake or near injection point underground:Liquid CO_2

How we can stabilize atmospheric CO_2 level



Uptake potential of surface Earth



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IPCC Special Report on CO_2 Capture & Storage

- The first Lead Author meeting was held in Oslo, July 2-4, 2003
- To be completed in mid-2005
- Basis for the negotiation on UNFCCC
- Inventory issue is the key